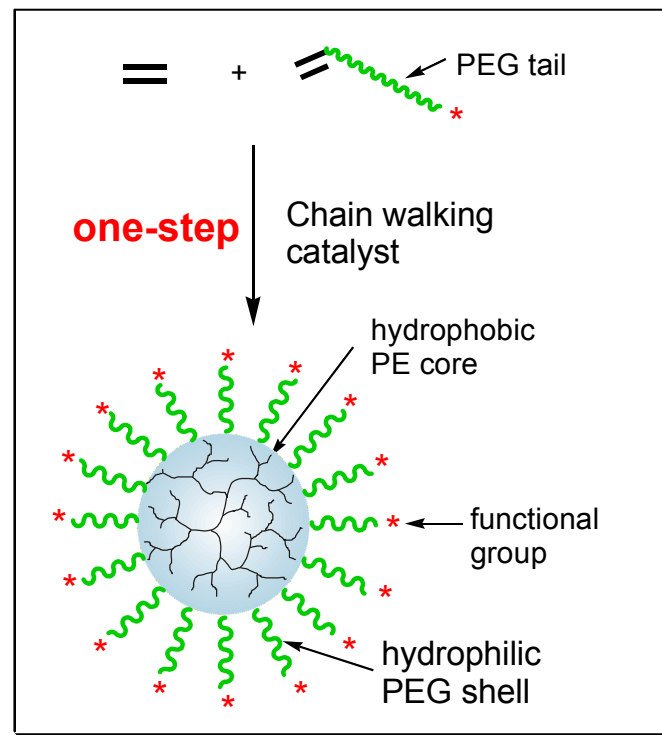


# One-Pot Synthesis of Amphiphilic Core-Shell Dendritic Polymers as Nanocarriers

Zhibin Guan, University of California - Irvine DMR-0135233

Amphiphilic soft nanoparticles have many potential applications including drug delivery and presenting multivalent ligands. Developing efficient synthesis of this type of soft nanoparticles is challenging and needed. Using the Brookhart chain walking catalyst, copolymerization of ethylene and a comonomer with a polyethylene glycol (PEG) tail afforded, in one step, amphiphilic copolymer having hydrophobic core and hydrophilic shell. Light scattering, fluorescence and UV/Vis spectroscopic studies with Nile Red in aqueous solution showed unimolecular micellar properties for the copolymers. The unimolecular micellar properties coupled with the good water solubility and biocompatibility of the PEG moieties make these molecular nanocarriers promising candidates for a variety of biomedical applications.

*J. Am. Chem. Soc.* **2004**, 126, 2662 (the work was highlighted in C&EN News **2004**, March 1, page 27)



## Unique features of the soft nanoparticles:

- Highly efficient one-pot synthesis
- PEG shell affords water solubility & biocompatibility
- Covalently linked highly stable amphiphiles
- Surface functionalizable (scaffold for multivalency)

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## Education:

Under the support of this grant, currently one graduate student is finishing his Ph.D. degree: Guanghui Chen (4<sup>th</sup> year); with partial support of this grant, two post-doctoral scientists have been involved in this research program: Dr. Drexel Camacho (accepted a job offer from DuPont Central Research Laboratory) and Dr. Jingsong You (now Professor at Sichuan University in China); two undergraduate students have also been trained through doing undergraduate research on this project: Mr. Justin Lanz and Ms. Larissa Madrid.

## Outreach:

For each summer in the past two years, I have participated in the California State Summer School for Mathematics and Science (COSMOS) program. The mission of COSMOS is to motivate the most creative minds of the new generation of prospective scientists, engineers, and mathematicians who will become leaders for California, the nation, and the world. I discussed about polymer science, nanomaterials and biomaterials topics with a class of very bright high school students.